

CRUISE REPORT

CRUISE BLM M-2 - R/V OCEANUS 108

9 Nov - 21 Nov 1981

8/1038

Objective: Cruise BLM M-2 was the second in the seasonal sampling series to collect infauna and benthic sediment samples to be used as base line analyses for the Georges Bank Lease Sale No. 42 environmental monitoring program. The major emphasis of the program will determine the extent of deposition and accumulation of toxic materials as a result of oil drilling activities and any subsequent effects on the benthic biota.

Sampling Program: The sampling plan is based on guidelines proposed by the Biological Task Force, the U.S. Geological Survey, and the Bureau of Land Management. 18 regional sampling sites include cross-shelf transects to the east or "upstream" of the lease sale tracts that will be considered as control sites. Actual impact on the benthic infauna communities will be studied at transects through the lease tracts and "downstream" from the drilling sites. Additional regional sites were selected at the head of Lydonia Canyon, in the depositions "mudpatch" area and at Block 410 where drilling has already commenced.

A site-specific array of 28 stations in Block 312 will determine the spatial variability of the sediments and benthos in an area where actual drilling will commence late 1981.

Samples from BLM M-2, the second monitor program cruise, will be considered as Fall 1981 seasonal data collections.

Comments: The density of sampling stations for the monitor program dictates the use of Loran-C as the major navigational aid for station positioning. The sites are too far from land to utilize dedicated ranging systems; satellite navigation in its present state does not present enough "fixes" to make an accurate location for each station. The 9960 Loran-C net, using the 13K and 43K chain, is accurate to within a hundred meters in the Georges Bank area during most atmospheric conditions. Frequent users in the area, such as fishing vessels and local research groups, report that by using time delay data, instrument and other gear sites are revisited with high accuracy.

Although most Loran-C receivers will probably agree to within several tenths of a microsecond in time delay measurements, manufacturers have chosen a variety of computational programs to determine latitude and longitude. This intra-instrument variability is further confused by a regional geodetic offset that will vary with the distance from the master station depending on the ratio of land/sea travel time.

In order to ensure a program continuity of sampling station locations, it was decided to locate all regional stations relative to the average T.D. point recorded during cruise M-1 (July 1981). A list of these points is given in Table 1. Also listed in Table 1 are the latitude and longitude "target" points for each station. Exceptions to the above are Regional Sites 16, 17, 18 and 5. Navigation for all regional sites during cruise M-1 was achieved by Northstar 6000 program-computed latitude-Longitude fixes; Time delay data were not available for these sites at that time. The following site-specific stations were also centered on time delay averages from Cruise M-1: 5-29; 5-25; 5-18, 5-16, 5-14, 5-28.

Regional stations 16, 17, 18 which are related to the actual ZAPATA SARATOGA position at Block 410 drill rig site were located visually just beyond the anchor network perimeter to the northeast (17) and southwest (18) of the rig. Station 16 was located at the supply-ship anchor mooring 200 m south of the actual rig site. This was the closest point to the rig that deteriorating weather conditions would allow us to sample.

The monitor program site specific stations are centered at regional site 5, which will be the actual site of drilling operations to commence in the near future. The site coordinates, $40^{\circ}39.4602\text{N}$; $67^{\circ}45.8813\text{W}$, are geodetic coordinates. In order to correlate Loran-C positions to the geodetic site, a series of simultaneous Loran-C and satellite fixes were plotted. From these plots it was determined that the offset for Loran-C latitude/longitude should be .20 nautical miles to the northeast from the drill site. All subsequent site specific stations were then replotted on this "Loran-C Grid" with station 5-1 as the center point. Table 2 records the assumed Loran-C latitude and longitude plots with the observed time delay point closest to the computed latitude/longitude site. Also given in Table 2 are the average time delay points for the actual samples taken (9 total grab replicates at each station).

Cruise Report: The cruise, due to some weather problems, was accomplished in two legs Woods Hole to Woods Hole on board R/V OCEANUS:

Cruise 108:

Leg 1	1230 - Nov 9 to 2300 Nov 15, 1981
Leg 2	0800 - Nov 17 to 2200 Nov 20, 1981

G+DAY

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The major portion of the data collection were sediment grab samples for chemical and biological analysis. The actual number of samples varied for the Regional and Site Specific stations as did the need for camera stations at each site. Epibenthic trawls were undertaken using the "Day Dredge" with 1/2" mesh nylon netting liner to recover bivalves for tissue analysis. Water samples for DO and Salinity were taken at near-bottom and surface depths at each Regional Site. XBT casts were made at each Regional Site.

During the first day of Leg 1, two ancillary programs were accomplished:

1. A moored water-level recorder was deployed south of Nantucket Island.

2. An attempt was made to recover a towed camera system that had been lost ten days previously during BLM supported investigations in the Lydonia Canyon area. Although eventually hooked by the grapnel, subsequent retrieval efforts were frustrated as the grapnel hooks were unable to effect a permanent grip on the instrument frame.

The bottom camera system had problems with the bottom-contact switch for the first series of Regional Site stations. Modifications were made while continuing with subsequent station work in the hopes that sufficient time would be available at the end of the cruise to reoccupy the camera sites that had not been accomplished. As it evolved, this was not possible; three of the regional stations do not have camera coverage for Cruise M-2. Further camera complications occurred at station 5-16 when the hydrowire snapped during a particularly large wave surge in 12 foot swell sea conditions. Following this instrument loss further camera stations were abandoned.

Under conditions that equally combine a precision navigation exercise with phenomenal luck, the camera was recovered during the last phase of the cruise operations under the guidance of Bill Strahle of USGS. Although no visual damage had been sustained by the camera components, the bottom contact switch failed to operate when we attempted to reoccupy several of the Site Specific stations to complete the camera work.

The grab sampling operations were variously successful, ranging from efficient recovery rates in areas of fine-coarse grained sediments with no bivalves to utter frustration (Station 15) where there appears to be very little sediment cover in the shallow waters of the Georges Bank shoal area. Despite marginal weather conditions about 20% of the time, mechanically, the grab samplers functioned flawlessly. However, grab samples were lost when the wire angle was high due to accelerated tidal current drift or when wave surges caused the sampler to release early.

Extreme care was taken to assure sample integrity and to avoid any contamination from external sources. Preliminary sediment sieving for biological sampling was completed on deck following each successful grab recovery. Hydro-carbon and trace metal samples were packaged and frozen for cost cruise analysis.

Due to weather and ship-time availability constraints not all of the proposed secondary site specific stations were sampled. With the exception of the camera sampling (because of the earlier instrument loss), all primary site-specific stations were successfully completed.

The OCEANUS is a very comfortable sampling platform with sufficient space for sample analysis and storage. Station-keeping was excellent despite the weather and tidal conditions at this time of year on Georges Bank. Very little actual sampling time was infringed upon by repositioning maneuvers.

The scientific group of 12 persons performed heroically in two watches of 6 persons working 6 hours on, 6 hours off. This is not a recommended procedure for future sampling programs where there is no transit time between stations to catch up on non-watch "housekeeping" needs.

Participating Scientific Personnel:

BLM	Phillip Thomas, OCS, N.Y. Jeffrey Hyland, OCS, N.Y.
WHOI	Rosemarie Petrecca
USGS	Carol Parmenter Rick Rendigs William Strahle Paul Bowker David Brewster Larry Poppe
LAMONT	Michael Rawson David Keil John Erhard Bill Hunneke

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REGIONAL STATIONS
CRUISE BLM M-2 (OCEANUS 108)

Table 1

Sta No.	Date & Time	BTF Position	M-1 Avg T.D.	Closest M-2 Lor-C 1/1	M-2 Avg T.D.	Bio .1m ²	Chem .1m ²	Bio .04m ²	Comments
13R	9-10 Nov 2330 - 0510	40°29.5'N 70°12.6'W	14201.9 43496.1	40°29.2'N 70°12.4'W	14201.8 43496.0	6	3	6	Epibenthic Sled, no camera, CHN addtl; 60m.
6R	11 Nov 0441 - 0755	40°34.3'N 67°45.3'W	13465.9 43425.5	40°34.4'N 67°45.3'W	13465.7 43425.4	6	3	6	NG:1; no camera; 93m.
7R	11 Nov 1206 - 1748	40°28.8'N 67°43.2'W	13477.9 43391.1	40°28.7'N 67°42.7'W	13478.2 43390.8	6	3	6	Camera; Day Dredge NG:2 160-180m.
8R	11 Nov 2056 - 2345	40°27.1'N 67°37.4'W	13459.8 43379.1	40°27.2'N 67°37.1'W	13459.8 43379.1	6	3	6	Camera; NG:5; 140m.
9R	12 Nov 0231 - 0624	40°26.7'N 68°09.8'W	13604.1 43394.2	40°26.7'N 68°09.7'W	13603.9 43394.3	6	3	6	Camera; NG:1; 140m.
12R	12 Nov 0817 - 1230	40°22.2'N 68°30.2'W	13712.9 43378.0	40°22.1'N 68°29.7'W	13712.7 43377.6	6	3	6	Camera; NG:20; 1405m.
11R	12 Nov 1510 - 1749	40°30.8'N 68°33.7'W	13698.0 43433.5	40°30.8'N 68°33.5'W	13698.1 43433.5	6	3	6	Camera; NG:1 80m.
10R	12 Nov 1947 - 2218	40°42.0'N 68°35.3'W	13661.8 43502.7	40°42.0'N 68°35.1'W	13661.6 43502.4	6	3	6	Camera; NG:19; 60m.
14R	13 Nov 0543 - 0951	41°34.2'N 68°59.0'W	13553.5 43834.5	41°34.1'N 68°58.8'W	13553.3 43834.5	6	3	6	Camera; NG:1; 38m

Cruise BLM M-2 (OCEANUS 108)

Table 1 p.2

Sta No.	Date & Time	BTF Position	M-1 Avg T.D.	Closest M-2 Lor-C 1/1	M-2 Avg T.D.	.1m ² Bio	.1m ² Chem	.04m ² Bio	Comments
15R	13 Nov 1410-1752	41°27.5'N 68°00.7'W	13302.0 43735.2	41°27.4'N 68°00.5'W	13302.5 43735.0	6	3	6	Camera; NG:29; 37m.
1R	13-14 Nov 2221-0101	41°13.0'N 67°15.3'W	13172.3 43615.2	41°12.4'N 67°14.7'W	13172.0 43614.9	6	3	6	Camera; NG:15; 58m.
2R	14 Nov 0343-0753	40°59.0'N 66°55.8'W	13156.5 43532.0	40°59.2'N 66°55.9'W	13156.7 43531.7	6	3	6	Camera; Day Dredge; NG: 3 70m.
3R	14 Nov 1007-1444	40°53.7'N 66°46.5'W	13144.2 43496.7	40°53.7'N 66°46.5'W	13144.6 43496.3	6	3	6	Camera; NG:20 67m.
4R	14-15 Nov 2224-0120	40°50.7'N 68°00.2'W	13464.5 43529.2	40°50.8'N 68°00.2'W	13464.4 43529.1	6	3	6	Camera; NG:7 67m.
17R	18 Nov 0133-0055	40°35.0'N 67°11.7'W	13320.5 43409.5	40°35.1'N 67°11.5'W	13321.2 43410.3	6	3	6	Camera; NE of Zapata Rig; Radar Posn relative to rig; 134m
18R	18 Nov 0307-0557	40°33.5'N 67°13.7'W	13335.8 43402.6	40°33.5'N 67°12.6'W	13332.0 43402.1	6	3	6	Camera; SW of Zapata Rig; Radar Posn relative to rig; 150m.
16R	18 Nov 0758-1056	40°34.2'N 67°12.3'W	13328.3 43406.8	40°34.8'N 67°12.1'W	13324.8 43409.1	6	3	6	Camera; 200m S of Zapata Rig; Tied to Mooring Bouy 137m.
6R	18 Nov 1525-1536	40°34.3'N 67°45.3'W	13465.9 43425.5	40°34.4'N 67°45.3'W	13466.2 43425.0		5 gals Chem	Std only	93m.

CRUISE BLM M-2 (OCEANUS 108)
SITE SPECIFIC STATIONS

Table 2

Sta No.	Date & Time	BTF Position	M-1 Avg T.D.	Closest Lor-C 1/1	M-2 Avg T.D.	.1m ² Bio	.1m ² Chem	.04m ² Bio	Comments
5-29	15 Nov 0350-0600	40°39.5'N 67°50.4'W	13466.5 43459.1	40°39.7'N 67°50.3'W	13466.5 43459.0		3	6	Camera; NG:1; 82m.
5-25	15 Nov 0648-1020	40°39.5'N 67°49.0'W	13459.7 43457.1	40°39.6'N 67°48.6'W	13459.5 43457.2		3	6	Camera; NG:9; 80m.
5-18	18 Nov 1747-2014	40°39.6'N 67°47.6'W	13453.8 43456.2	40°39.6'N 67°47.3'W	13453.6 43455.9		3	6	Camera; NG:4; 80m.
5-16	18 Nov 2124-2350	40°40.6'N 67°46.1'W	13443.3 43461.1	40°40.6'N 67°45.9'W	13443.2 43461.3		3	6	Lost Camera; 79m.
5-14	19 Nov 0057-1230	40°39.5'N 67°44.7'W	13441.6 43454.2	40°39.6'N 67°44.4'W	13442.0 43454.5		3	6	NG:1; 82m.
5-28	19 Nov 0307-0425	40°39.5'N 67°41.9'W	13429.6 43452.4	40°39.6'N 67°41.7'W	13429.8 43452.5		3	6	80m.
5-1	19 Nov 0513-0708	40°39.5'N 67°46.2'W	13447.8 43454.9	40°39.5'N 67°45.7'W	13447.1 43454.7		3	6	NG:1; 81m.
5-2	19 Nov 0813-0942	40°39.6'N 67°45.8'W	13446.0 43455.2	40°39.5'N 67°45.3'W	13445.5 43454.6		3	6	NG:4 80m
5-3	19 Nov 1029-1153	40°39.8'N 67°46.1'W	13446.4 43456.1	40°39.5'N 67°45.7'W	13445.8 43456.7		3	6	80m.

Note: Following M-2 Positions reflect Loran-C computed latitude and longitude positions as offset 0.2 nm to NE of true site 5-1: 40°39.4602'N, 67°45.8813'W. All following Site Specific stations have been replotted on new grid with M-2 Site 5-1 Loran-C position as the centre. M-2 Lor-C point is this replotted position for each site.

SITE SPECIFIC STATIONS

Sta No.	Date & Time	BTF Position	M-1 Avg T.D.	Closest M-2 Lor-C 1/1	M-2 Avg T.D.	.1m ² Bio	.1m ² Chem	.04m ² Bio	Comments
5-4	Nov 19 1218- 1337	40°39.5'N 67°46.5'W	13449.3 43455.3	40°39.5'N 67°46.2'W	13449.2 43455.1	3	3	6	NG:2; 81m.
5-5	Nov 19 1421- 1517	40°39.3'N 67°46.2'W	13448.8 43453.6	40°39.2'N 67°45.7'W	13448.4 43452.8	3	3	6	NG:3; 81m.
5-6	Nov 19 1604- 1653	40°39.5'N 67°45.4'W	13444.7 43454.6	40°39.5'N 67°44.9'W	13443.5 43454.2	3	3	6	81m.
5-8	Nov 19 1718- 1825	40°40.1'N 67°46.1'W	13445.3 43458.3	40°40.2'N 67°45.7'W	13444.3 43458.6	3	3	6	NG:2; 80m.
5-9	Nov 19 1938- 2036	40°39.9'N 67°46.7'W	13448.6 43457.7	40°40.1'N 67°46.5'W	13448.2 43458.3	3	3	6	80m.
5-10	Nov 19 2113- 2225	40°39.4'N 67°46.9'W	13451.4 43455.4	40°39.5'N 67°46.6'W	13451.2 43455.3	3	3	6	NG:1; 80m.
5-11	Nov 19 2252- 2354	40°39.2'N 67°46.6'W	13451.3 43453.4	40°39.1'N 67°46.3'W	13451.7 43452.6	3	3	6	NG:1; 80m.
5-12	Nov 20 0035- 0129	40°39.0'N 67°46.1'W	13449.7 43452.2	40°38.9'N 67°45.7'W	13450.0 43451.1	3	3	6	79m.
5-20	Nov 20 0156- 0245	40°38.5'N 67°46.1'W	13452.0 43448.4	40°38.2'N 67°45.7'W	13452.4 43447.4	3	3	6	80m.

SITE SPECIFIC STATIONS

Sta No.	Date & Time	BTF Position	M-1 Avg T.D.	Closest M-2 Lor-C 1/1	M-2 Avg T.D.	.1m ² Bio	.1m ² Chem	.04m ² Bio	Comments
5-22	20 Nov 0333-0424	40°39.5'N 67°43.3'W	13435.9 43453.5	40°39.5'N 67°43.3'W	13436.7 43453.5		3	6	80m.

DAY DREDGES: SITE SPECIFIC STATIONS

5-28	20 Nov	Start: 40°39.5'N 0504 67°41.4'W	13428.7 43452.2	End: 40°39.5'N 0534 67°42.8'W	13434.3 43452.9
5-1	20 Nov	Start: 40°39.5'N 0610 67°45.8'W	13447.4 43454.7	End: 40°39.5'N 0635 67°46.7'W	13451.3 43455.4
5-18	20 Nov	Start: 40°39.5'N 0658 67°47.1'W	13453.3 43455.6	End: 40°39.5'N 0725 67°48.1'W	13457.3 43456.3

Table 3

CRUISE BLM M-2 (OCEANUS 108)

SAMPLE LISTING

Type Sample	Sample Designations	Total No. Samples	Comments
.1m ² Biology	A - F	108	
.1m ² Chemistry	G - I	108	
.04m ² Biology	J - P	216	Note: No designation "0"
Dredge/ Epibenthic Sled		6	
Camera	Site Sta No.	19	Minimum 20 frames per Site.
Diss O ₂	DO---	18	Regional Sites: 1 ea.
Salinity	BS---	36	Regional Sites: 1 ea Near- bottom & Surface
CHN		216	Taken from .04m ² Bio grabs
Grain Size		216	Taken from .04m ² Bio grabs

Note: All samples listed by Station Site No. (eg. BLM M-2 13R-A)

Information regarding Cruise BLM M-2 should be directed:

Bio .04m ² Samples:	Rose Petrecca, WHOI
Bio .1m ² Samples :	Jeff Hyland, BLM NY OCS Ofc, N.Y.
Chem .1m ² Samples:	Mike Bothner, U.S.G.S., Woods Hole
, Navigation :	Michael Rawson, Lamont